mining factor for the form of the plant, whether the cells are immersed in solution or supported upon gelatin or upon porous plates; and as darkness has no effect upon the form of this plant, its polymorphism does not depend upon photosynthesis. His physiological experiments have been supplemented by a considerable series of physico-chemical tests in order to determine whether error had been introduced into his experiments by assumption that complete ionization occurred in his solutions of electrolytes. He finds that the osmotic pressure calculated by the freezing point method, and in some cases also by the boiling point method, conforms so closely to the osmotic pressure calculated on the assumption of complete ionization, that no error had been introduced, the differences between the calculated and determined pressures lying entirely within the range of the pressure limits found for the several responses of the plant.

T. C. Johnston publishes some results in connection with intramolecular respiration, and Dr. J. Schneck records some interesting observations on *Aquilegia Canadensis* and *A. vulgaris*.

SOCIETIES AND ACADEMIES.

AMERICAN MATHEMATICAL SOCIETY.

A REGULAR meeting of American Mathematical Society was held at Columbia University on Saturday, October 26, extending through the usual morning and afternoon sessions. The first part of the afternoon session was devoted to a joint meeting with the American Physical Society at which a paper 'On the Theory of Elastic Plates' was read by Professor J. Hadamard, the representative of the University of Paris at the recent Yale Bicentennial. About forty persons were present at the joint session, which was presided over by President Michelson, of the Physical Society. At the separate session of the Mathematical Society, at which Vice-President Thomas S. Fiske occupied the chair, thirty-three members of the Society were in attendance. Twelve persons were elected to membership: Mr. C. H. Ashton, Harvard University; Professor H. Y. Benedict, University of Texas; Dr. William Findlay, Columbia University; Dr. W. B. Fite, Cornell University; Professor G. W. Greenwood, McKendree College; Professor F. W. Hanawalt, Iowa Wesleyan University; Dr. E. V. Huntington, Harvard University; Professor H. W. Kuhn, Ohio State University; Dr. I. E. Rabinovitch, New York City; Professor W. D. Tallman, Montana State Agricultural College; Mr. H. M. Tory, McGill University; Mr. A. H. Wilson, Princeton University. Seven applications for membership were received. The By-laws of the Society were amended to provide that the presidential address shall hereafter be delivered at the last meeting of the presidential term. As the amendment takes effect at once, President Moore's address will be postponed to the annual meeting of December, 1902.

The following papers were presented at this meeting:

PROFESSOR G. A. MILLER: 'On the abelian groups which are conformal with non-abelian groups.'

DR. H. F. STECKER: 'Concerning the elliptic $\wp(g_2; g_3; z)$-functions as coordinates in a line complex, and certain related theorems.'

MISS I. M. SCHOTTENFELS: 'Generational definition of certain groups of order 960.'

PROFESSOR OTTO STOLZ: 'Zur Erklärung der Bogenlänge und des Inhaltes einer krümmen Fläche.'

DR. L. P. EISENHART: 'Conjugate rectilinear congruences.'

PROFESSOR S. E. SLOCUM: 'The symbols of the infinitesimal transformations which generate the parameter groups corresponding to all possible types of structure of two-, three- and four-parameter complex groups.'

DR. E. V. HUNTINGTON and DR. J. K. WHITTEMORE: 'Some curious properties of conics touching the line infinity at one of the circular points.'

PROFESSOR J. HADAMARD: 'On the theory of elastic plates.'

PROFESSOR E. B. VAN VLECK: 'On the zeros of fundamental integrals of regular linear differential equations of the second order, with a determination of the number of imaginary roots of the hypergeometric series.'

DR. E. J. WILCZYNSKI: 'Reciprocal systems of linear differential equations.'

DR. I. E. RABINOVITCH: 'On some contradictions involved in the elliptic geometry in a point space.'

DR. EDWARD KASNER: 'Determination of the integrals in the calculus of variations leading to an assigned system of extremals.'

The members of the two societies lunched together at the University restaurant, and in

the evening several of the members dined at Mock's restaurant in Forty-Second street. These opportunities for informal intercourse are always an enjoyable feature of the meetings. The Christmas meetings of both societies extend through the two days, Friday and Saturday, December 27–28, and it is hoped that a considerable number of the members will arrange to attend the informal dinner which will be arranged for Friday evening.

F. N. COLE,
Secretary.

SECTION OF GEOLOGY AND MINERALOGY OF THE NEW YORK ACADEMY OF SCIENCES.

THE first meeting of the Section was held on October 21. In calling the meeting to order the chairman spoke of the loss to the Academy and to science occasioned by the deaths of Dr. T. G. White, secretary of the Section, and Professor Joseph Le Conte, corresponding member of the Academy. A committee consisting of Professors J. J. Stevenson and J. F. Kemp was appointed to draw up suitable minutes in reference to Dr. White and Professor Le Conte. Dr. E. O. Hovey, of the American Museum of Natural History, was then elected secretary of the Section.

The following program was offered: Dr. A. W. Grabau spoke on 'Recent Contributions to the Problem of Niagara.' He said that Davis has shown that the topography of the Niagara region conforms to the type generally found in ancient coastal plains, the original features of which have been more or less modified by subsequent warpings, and by glacial erosion and deposition.

The Niagara escarpment is the inface of the Niagara cuesta, traceable through the Indian Peninsula and Grand Manitoulin Island. The Ontario lowland is continued in the Georgian Bay lowland. A second cuesta—the Onondaga—has its inface slightly developed north of Buffalo, but becomes prominent in the Lake Huron valley, where its inner lowland forms the deeper part of the lake. The third cuesta and lowland (the Erie) occurs north of the second.

The Tertiary drainage is supposed to have been to the southwest, instead of the northeast, as Spencer holds. The principal streams of that time are supposed to have been (1) the Saginaw, whose path is indicated in part by Saginaw Bay and the deep channel between the Indian Peninsula and Grand Manitoulin Island; (2) the Dundas, breaching the Niagara cuesta at Hamilton, Ont., and crossing the Erie lowland near Fort Stanley; and (3) for a time, at least, the Genesee, though this may later have had a northward course. The subsequent streams tributary to these consequents carved the various lowlands. St. Davids channel is regarded as an obsequent stream, which was accidentally discovered by the Niagara. The whirlpool gorge was probably, in part, the southward continuation of this stream, and not wholly postglacial.

Professor J. F. Kemp's first paper was on the 'New Asbestos Region in Northern Vermont.'* He said that asbestos has recently opened up on a commercial scale in the towns of Eden, Lamoille Co., and Lowell, Orleans Co., Vt. The towns are adjacent, although in different counties. The asbestos lies from 15 to 25 miles north of Hyde Park, a station on the St. Johnsbury and Lake Champlain R. R. As is quite invariably the case, it occurs in serpentine, either in veins or in matted aggregates along slicken-sided blocks. The serpentine where the best fiber is found lies on the south shoulder of Belvedere Mountain, and forms an east and west belt. It is bounded on the north and west by hornblende-schist, which forms the summit of the mountain. The contact on the west is a visibly faulted one, and that on the north is probably also of the same sort, because the hornblende-schist rises in a steep escarpment.

The serpentine seems to have been derived from enstatite, diallage and probably olivine, since unaltered nuclei of these minerals are found in it. The vein asbestos ranges from a fiber of microscopic length up to $\frac{3}{4}$ of an inch as thus far exposed. It is fine and silky and of excellent grade. It would, however, be classed as second grade according to the Canadian practice, which makes a first grade, of fiber above $\frac{3}{4}$ of an inch (about $2\frac{1}{2}$ in. being the maximum), and a second grade of $\frac{3}{8}$ in. to $\frac{3}{4}$

*Communicated by permission of the Director of the U. S. Geological Survey.

in. All below this and all fiber not vein fiber goes to the mill and is mechanically separated, as the third grade. In the Vermont localities the slip fiber is exposed on the property of the New England Co., and of its neighbor, the American Co. The vein fiber is limited, so far as yet opened up, to the property of Mr. M. E. Tucker and associates.

It is difficult, with the data in hand, which were gathered under the direction of Dr. C. W. Hayes, of the U. S. Geological Survey, to trace the geological history of the serpentine, but it must have been originally either an igneous pyroxenite or peridotite or else a richly magnesian siliceous limestone. There are such slight traces of calcium-bearing minerals, however, that the former supposition has the greater weight. The hornblende-schist consists in largest part of common green hornblende but one may also observe epidote, zoisite and some minor accessories.

Professor Kemp also gave a paper on the 'Physiography of Lake George.' The observations, extending over several years, have suggested the following conclusions: Lake George occupies a submerged valley very similar to many others in the Adirondacks which are not submerged. The valley has been largely produced by faulting, and the fault-scarps still remain in precipitous cliffs, whose sharpness has not been much affected by weathering and erosion. Before the Pleistocene the valley was probably a low pass with both a north and a south discharge. The portion rich in islands near Pearl Point and the Hundred Island House was probably the divide, and the islands represent the old hillocks near the top of the divide. At the south the water is backed up by sands and morainal matter in the valleys on each side of French Mountain, viz., at the head of Kattskill Bay and at Caldwell. On the north they are held in by Champlain clays and syenitic gneiss at the Ticonderoga outlet, and probably by morainal material at the low pass just south of Rogers Rock and leading out to the very depressed Trout brook valley, just west of Rogers Rock and Cook mountains. Trout brook is now as much as a hundred feet lower than Lake George at points south of the Ticonderoga barrier. The northern barrier is rock, because the Ticonderoga river passes through a narrow and shallow channel in the exposed ledges a mile south of its actual first waterfall. There is here a broad flat valley buried in clays, however, beneath which an old channel may lie submerged. At the same time the marked depth of the Trout brook valley to the west makes this the natural outlet, and there is reason to believe from the general topography that the discharge passed north into the Champlain valley near the south boundary of Crown Point. It is also not to be overlooked that a valley with much drift leads eastward to Lake Champlain, from the head of Mason's Bay.

A curious feature that is common to both shores of the lake north of Sabbath Day Point (and perhaps also south of it) is the presence of pot holes of great perfection and as high at times as 80 feet above the present level of the lake. These are best developed on Indian Kettles Point, about two miles north of Hague. They were doubtless excavated by lateral or subglacial streams when the ice filled the lake valley, because in no other conceivable way could flowing water be forced into such unnatural situations.

There is great need of a good hydrographic survey of the lake, and of detailed pilot charts, with soundings. They would be of great service, not alone to navigators, but to science as well. So far as could be learned from local fishermen, whose deep trolling for lake trout gives them familiarity with the bottom, there appear to be channels whose general trend is parallel with the long dimension of the lake, and which have precipitous sides, precisely like the valleys and gulches now visible. The lake is relatively shallow as compared with Lake Champlain. In Lake George, the greatest depth is believed to be near Anthony's Nose, and to reach 190 feet. Elsewhere the deep parts are placed at about 100 feet, more or less. All this, however, requires confirmation by soundings. With regard to the physiography of the bottom one cannot say to what extent the valley has been filled by drift, but the islands to which physiographic importance has here been given are rock.

Richard E. Dodge,
Secretary pro tem.

BOTANICAL SEMINAR OF THE UNIVERSITY OF NEBRASKA.

AT the regular meeting on November 1, Dr. Roscoe Pound read a paper on 'The Purpose and Force of Botanical Laws,' directing attention to the fact that rules of procedure in science are as necessary as they are in civil life, and indicating that the method by which laws are obtained in the one case must be similar to those in the other. The paper was discussed by Professor Bessey (who spoke of the supposed danger of a repression of originality through the action of laws of science); Dr. Wolcott (who called attention to the code of laws and their successful execution in ornithology); and Dr. Clements (who discussed a proposed series of regulations in regard to the nomenclature of plant geography).

DISCUSSION AND CORRESPONDENCE.

PREGLACIAL DRAINAGE IN SOUTHWESTERN OHIO.

TO THE EDITOR OF SCIENCE: In the issue of SCIENCE of October 4, Professor Arthur M. Miller offers an objection to the conclusions of Mr. Fowke, made from his studies on the drainage features of southwestern Ohio, in which Mr. Fowke has shown (*Bulletin of the Scientific Laboratories of Denison University* and *Special Paper No. 3 of the Ohio State Academy of Science*) that the preglacial drainage of the section of the Ohio river from Manchester, Ohio, to Madison, Ind., was to the northward along the line of the lower Big Miami and the Mill creek valleys to Hamilton. It has been my pleasure to have studied somewhat carefully the region under discussion in my field work, and the objections which seem so apparent to Professor Miller have not appeared so to me. While I would agree in the main with Professor Miller in his argument concerning the formation of reentrants made by up-stream cutting against an escarpment and the stratigraphic relations of stream gradient and dip, under which similar reentrants would be formed by streams flowing in the direction of the dip, I cannot see that there is much force in the application of these principles to the problem under discussion. There is no question but that many of the reentrants found in the Clinton limestone outcrop of the region shown by Professor Miller's map were made in the manner he suggests. I have observed many of them in the field. But at the same time there are many possibilities of there being, in this same region, large valleys deeply buried under the mantle of drift running in the opposite direction from that of these reentrants which were formed by the backward-cutting streams. In all cases which I have observed of these reentrants made by backward-cutting streams, they might have as well formed part of a system of lateral tributaries to a main northward-flowing stream as to that of a southward-flowing one. Unfortunately the region which Professor Miller has chosen in his map and studies is not the same as that which furnished the data for the determination of the northward direction of the preglacial waters from the vicinity of Cincinnati and it would be hardly necessary to review these data at this time, as the full reports are easily accessible in the articles referred to and are not discussed by Professor Miller. It may be well to state, however, that the criteria used in the location of the preglacial lines of drainage are not confined to a study of comparative 'width-of-channel' of streams, but the conclusions are based upon a broader study of topographic forms, comparative erosion, distribution and direction of shingling of old gravels on the old graded valley floors, normal and abnormal stream relations and many other similar lines of evidence.

In Professor Miller's closing paragraph he speaks of the symmetry shown by the streams north and south of the Ohio river as adding force to the argument in favor of the present arrangement of the streams being also the preglacial arrangement, and he considers the Ohio as the main and parent stream. There seems to be an abundance of evidence, already published, to show that in preglacial times a strong watershed crossed the Ohio river near Manchester, Ohio, and that the section of the Ohio immediately above Manchester found its way up the reversed Scioto in preglacial times. With the Ohio river above Cincinnati reduced to a small stream (which Mr. Fowke calls Old Limestone) heading only at Manchester, it